

IN THE CLAIMS

This listing of claims replaces all prior versions and listing of claims in the application:

1. (currently amended) A balloon catheter for performing an angioplasty procedure on a lesion in a vessel comprising a flexible elongate catheter shaft having proximal and distal extremities, a balloon secured to the distal extremity of the catheter shaft and having proximal and distal extremities and having an interior and movable between deflated and inflated conditions, the catheter shaft having a balloon inflation lumen extending from the proximal extremity to the distal extremity of the catheter shaft and opening into the interior of the balloon, a fitting for supplying an inflation medium to the inflation lumen for causing movement of the balloon from the deflated condition to the inflated condition, said balloon having an outer surface extending from the proximal extremity to the distal extremity of the balloon which moves outwardly radially upon inflation of the balloon and at least one flexible elongate element extending over the outer surface of the balloon from the proximal extremity to the distal extremity of the balloon, said flexible elongate element ~~being secured about~~ having proximal and distal extremities fixed longitudinally relative to the catheter shaft in at respective positions spaced longitudinally away from proximally and distally of the outer surface of the balloon to permit whereby expansion of the balloon and to cause causes movement of the flexible elongate element into engagement with the lesion to form a longitudinal channel in the lesion.

2. (currently amended) A balloon catheter as in Claim 1 wherein a plurality of flexible elongate elements are provided which are spaced apart circumferentially of the balloon.

Claims 3-4. (cancelled)

5. (original) A balloon catheter as in Claim 1 wherein at least one of the proximal and distal extremities of the flexible elongate element is formed of an elastic material to permit stretching of the flexible elongate element during inflation of the balloon and retraction during deflation of the balloon.

6. (currently amended) A balloon catheter as in Claim 4~~5~~ wherein both of the proximal and distal extremities of the flexible elongate element are formed of an elastic material.

7. (original) A balloon catheter as in Claim 1 wherein said balloon when in a deflated condition is folded over the flexible elongate element to prevent injury to the vessel during delivery of the balloon to the lesion in the vessel.

8. (original) A balloon catheter as in Claim 1 wherein said flexible elongate element is substantially circular in cross section.

9. (original) A balloon catheter as in Claim 1 wherein said flexible elongate element is substantially triangular in cross section.

10. (original) A balloon catheter as in Claim 9 wherein said outer surface of the balloon in the inflated condition in cross section has a curved surface and wherein said flexible elongate element which is triangular in cross section has a surface in cross section which is concave to accommodate the curved outer surface of the inflated balloon and to provide a better fit between the balloon and the flexible elongate element as the balloon is expanded to bring the flexible elongate element into engagement with the lesion in the vessel.

11. (original) A balloon catheter as in Claim 9 wherein said flexible elongate element has a longitudinal axis and has longitudinally spaced apart cutouts therein to increase the flexibility of the flexible elongate elements along the longitudinal axes.

12. (currently amended) A balloon catheter as in Claim ~~11~~ wherein filler material is disposed in the cutouts.

13. (currently amended) A balloon catheter as in Claim 12 wherein said filler is a relatively soft material selected from a group consisting of an adhesive ~~or~~ and a polymer.

14. (currently amended) A balloon catheter as in Claim 1 wherein said flexible elongate element is formed of a rigid flexible material selected from a group consisting of stainless steel, Nitinol, Nylon, fluoropolymer and carbon fiber.

15. (currently amended) A balloon catheter as in Claim 2 wherein said flexible elongate elements are formed as a part of a cage mounted over the balloon and ~~comprising~~ including first and second spaced apart rings secured to the flexible elongate elements, said rings being spaced apart a sufficient distance so that the outer surface of the balloon can engage the flexible elongate elements, said rings being sized so that the ~~ease~~ cage is slidably mounted on the catheter shaft and

permitting the easeage to be slipped onto and over the balloon when the balloon is in a deflated condition and serving to retain the flexible elongate members in engagement with the balloon during inflation of the balloon.

Claims 16-19. (cancelled)

20. (new) A balloon catheter as in Claim 1 wherein the flexible elongate element is detached from the outer surface of the balloon.

21. (new) A balloon catheter for use with an inflation medium to perform an angioplasty procedure on a lesion in a vessel comprising a flexible elongate catheter shaft having proximal and distal extremities, a balloon secured to the distal extremity of the catheter shaft and having an inflatable portion provided with an interior, the catheter shaft having a balloon inflation lumen extending from the proximal extremity to the distal extremity and opening into the interior of the balloon adapted to supply the inflation medium to the interior so as to permit inflation of the balloon, and at least one flexible elongate element secured to the catheter shaft proximal and distal of the inflatable portion so as to extend longitudinally over the inflatable portion of the balloon and be in longitudinal tension over the inflatable portion of the balloon whereby upon inflation of the balloon the flexible elongate element is moved into engagement with the lesion to form a longitudinal channel in the lesion.

22. (new) A balloon catheter as in Claim 21 wherein a plurality of flexible elongate elements are provided which are spaced apart circumferentially of the balloon.

23. (new) A balloon catheter as in Claim 21 wherein the flexible elongate element has proximal and distal extremities, at least one of the proximal and distal extremities of the flexible elongate element being formed of an elastic material to permit stretching of the flexible elongate element during inflation of the balloon.

24. (new) A balloon catheter as in Claim 23 wherein both of the proximal and distal extremities of the flexible elongate element are formed of an elastic material.

25. (new) A balloon catheter for use with an inflation medium to perform an angioplasty procedure on a lesion in a vessel comprising a flexible elongate catheter shaft having proximal and distal extremities, a balloon secured to the distal extremity of the catheter shaft and having an inflatable portion provided with an interior, the catheter shaft having a balloon inflation lumen

extending from the proximal extremity to the distal extremity and opening into the interior of the balloon adapted to supply the inflation medium to the interior so as to permit inflation of the balloon, and at least one flexible elongate element having a proximal extremity secured to the catheter shaft proximal of the inflatable portion and a distal extremity secured to the catheter shaft distal of the inflatable portion whereby upon inflation of the balloon the flexible elongate element is moved into engagement with the lesion to form a longitudinal channel in the lesion, at least one of the proximal and distal extremities of the flexible elongate element being formed of an elastic material to permit stretching of the flexible elongate element during inflation of the balloon.

26. (new) A balloon catheter as in Claim 25 wherein both of the proximal and distal extremities of the flexible elongate element are formed of an elastic material.

27. (new) A balloon catheter as in Claim 25 wherein a plurality of flexible elongate elements are provided which are spaced apart circumferentially of the balloon.

28. (new) A balloon catheter for use with an inflation medium to perform an angioplasty procedure on a lesion in a vessel comprising a flexible elongate catheter shaft having proximal and distal extremities, a balloon secured to the distal extremity of the catheter shaft and having proximal and distal extremities and an inflatable portion provided with an interior, the catheter shaft having a balloon inflation lumen extending from the proximal extremity to the distal extremity of the catheter shaft and opening into the interior of the balloon adapted to supply the inflation medium to the interior so as to permit inflation of the balloon, and a cage slidably mountable on the catheter shaft so as to overlie the inflatable portion of the balloon, the cage having a plurality of circumferentially disposed flexible elongate elements and first and second spaced-apart rings, the first ring being secured to the flexible elongate elements and positioned about the catheter shaft in the vicinity of the proximal extremity of the balloon and the second ring being secured to the flexible elongate elements and positioned about the catheter shaft in the vicinity of the distal extremity of the balloon whereby upon inflation of the balloon the flexible elongate elements are moved by the inflatable portion into engagement with the lesion to form a longitudinal channel in the lesion.

29. (new) A balloon catheter as in Claim 28 wherein the first ring is positioned proximal of the inflatable portion and the second ring is positioned distal of the inflatable portion.

30. (new) A balloon catheter for performing medical procedure on a lesion in a vessel comprising:

a flexible elongate catheter shaft having proximal and distal extremities;

a balloon secured to the distal extremity of the catheter shaft and having an inflatable portion provided with an interior;

the catheter shaft having a balloon inflation lumen extending from the proximal extremity to the distal extremity and opening into the interior of the balloon and adapted to supply the inflation medium to the balloon interior so as to permit inflation of the balloon; and

at least one flexible elongate element detached from and extending over the inflatable portion of the balloon, said at least one flexible elongate member secured to the catheter shaft proximal and distal of the inflatable portion.

31. (new) The balloon catheter of Claim 30 wherein upon inflation of the balloon the flexible elongate element is moved into engagement with the lesion.